

Demonstration of A Social Robot for Control of Remote Autonomous Systems

Citation for published version:

Lopes, J, Robb, DA, Liu, X & Hastie, H 2020, Demonstration of A Social Robot for Control of Remote Autonomous Systems. in *HRI '20: Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction*. Association for Computing Machinery, pp. 75. <https://doi.org/10.1145/3371382.3378207>

Digital Object Identifier (DOI):

[10.1145/3371382.3378207](https://doi.org/10.1145/3371382.3378207)

Link:

[Link to publication record in Heriot-Watt Research Portal](#)

Document Version:

Peer reviewed version

Published In:

HRI '20: Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction

Publisher Rights Statement:

© 2020 Copyright held by the owner/author(s).

General rights

Copyright for the publications made accessible via Heriot-Watt Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

Heriot-Watt University has made every reasonable effort to ensure that the content in Heriot-Watt Research Portal complies with UK legislation. If you believe that the public display of this file breaches copyright please contact open.access@hw.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Demonstration of a Social Robot for Control of Remote Autonomous Systems

José Lopes
Heriot-Watt University
Edinburgh, United Kingdom
jd.lopes@hw.ac.uk

Xingkun Liu
Heriot-Watt University
Edinburgh, United Kingdom

David A. Robb
Heriot-Watt University
Edinburgh, United Kingdom

Helen Hastie
Heriot-Watt University
Edinburgh, United Kingdom

ABSTRACT

There are many challenges when it comes to deploying robots remotely including lack of situation awareness for the operator, which can lead to decreased trust and lack of adoption. For this demonstration, delegates interact with a social robot who acts as a facilitator and mediator between them and the remote robots running a mission in a realistic simulator. We will demonstrate how such a robot can use spoken interaction and social cues to facilitate teaming between itself, the operator and the remote robots.

KEYWORDS

Remote robots; autonomous systems; conversational agent

ACM Reference Format:

José Lopes, David A. Robb, Xingkun Liu, and Helen Hastie. 2020. Demonstration of a Social Robot for Control of Remote Autonomous Systems. In *Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction (HRI '20 Companion)*, March 23–26, 2020, Cambridge, United Kingdom. ACM, New York, NY, USA, 1 page. <https://doi.org/10.1145/3371382.3378207>

1 INTRODUCTION

Robotic and autonomous systems are being deployed in remote, hazardous locations. In such scenarios, human operators need to be kept continuously in the loop with the remote robots for safety reasons [4]. Studies have shown that keeping situation awareness high is particularly challenging with robots that are out-of-sight, thus decreasing trust [2] and creating a barrier to adoption for these key systems that keep humans out of harm's way [6]. We propose a mediator robot that is able to portray social signals to break down these barriers through human-robot interaction.

We present recent work, as part of the EPSRC ORCA Hub [3]¹, in the form of a demonstration of a voice-enabled automated assistant to help manage these types of scenarios, where robots are doing tasks autonomously and remotely. Here, we embody the voice-enabled assistant as a Furhat Robot [1] to enable natural interaction

¹This work was supported by the EPSRC ORCA Hub (EP/R026173/1, 2017-2021)

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

HRI '20 Companion, March 23–26, 2020, Cambridge, United Kingdom

© 2020 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-7057-8/20/03.

<https://doi.org/10.1145/3371382.3378207>

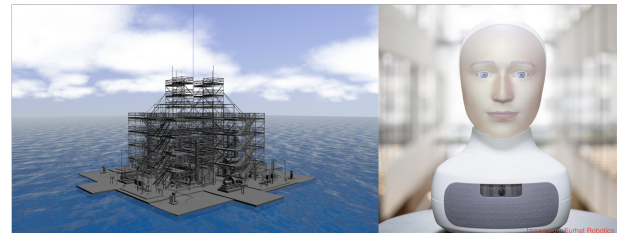


Figure 1: The Digital Twin of an offshore platform, on the left, where an emergency scenario will play out with the social Furhat robot, on the right.

and facilitate research into whether social signals can help manage trust and increase adoption.

2 THE DEMONSTRATION

In the demonstration, delegates will interact with the fully autonomous Furhat robot (see right of Figure 1) and be involved in a short game scenario. This scenario involves an emergency on an offshore energy platform, where there are two types of robots available to facilitate the task: Husky land-based robots and Quadcopter Unmanned Aerial Vehicles (UAVs). Specifically, participants are given a limited time (3 minutes) to extinguish a fire and assess the damage. If they do not complete these tasks within the time, they are told to evacuate the platform. This scenario will play out on a laptop next to the robot running a realistic Digital Twin simulator [5] (see left of Figure 1). This demonstration will provide a fun, immersive experience for delegates, who will be able to interact with a social robot, as well as, gain an understanding of the challenges of remote robots and autonomous systems.

REFERENCES

- [1] Samer Al Moubayed, Jonas Beskow, Gabriel Skantze, and Bjorn Granstrom. 2012. Furhat: A Back-projected Human-like Robot Head for Multiparty Human-Machine Interaction. In *Cognitive Behavioural Systems*. Springer.
- [2] W.A. Bainbridge, J. Hart, E.S. Kim, and B. Scassellati. 2008. The effect of presence on human-robot interaction. In *Proceedings of RO-MAN*.
- [3] H. Hastie, K. Lohan, M.J. Chantler, D.A. Robb, S. Ramamoorthy, R. Petrick, S. Vijayakumar, and D. Lane. 2018. The ORCA Hub: Explainable Offshore Robotics through Intelligent Interfaces. In *Proceedings of the HRI Workshop on Explainable Robotic Systems*.
- [4] Helen Hastie et al. 2019. Challenges in Collaborative HRI for Remote Robot Teams. In *Proceedings of the CHI2019 Workshop on The Challenges of Working on Social Robots that Collaborate with People (SIRCHI2019)*.
- [5] Eric Pairet, Paola Ardon, Jose Lopes Xingkun Liu, Helen Hastie, and Katrin Lohan. 2019. A Digital Twin for Human-Robot Interaction. In *Proceedings of HRI*.
- [6] David Robb et al. 2020. Robots in the Danger Zone: Exploring Public Perception through Engagement. In *Proceedings of HRI*.